

# PC714VxNSZXF Series

# DIP 6 pin General Purpose Photocoupler



#### **■** Description

**PC714VxNSZXF Series** contains an IRED optically coupled to a phototransistor.

It is packaged in a 6 pin DIP.

Input-output isolation voltage(rms) is 5.0kV.

Collector-emitter voltage is 80V and CTR is 50% to 600% at input current of 5mA.

#### **■** Features

- 1. 6 pin DIP package
- 2. Double transfer mold package (Ideal for Flow Soldering)
- 3. High collector-emitter voltage (V<sub>CEO</sub>:80V)
- 4. High isolation voltage between input and output (V<sub>iso(rms)</sub>: 5.0kV)
- 5. Lead-free and RoHS directive compliant

# ■ Agency approvals/Compliance

- Recognized by UL1577 (Double protection isolation), file No. E64380 (as model No. PC714V)
- 2. Approved by VDE, DIN EN60747-5-2<sup>(\*)</sup> (as an option), file No. 40008189 (as model No. **PC714V**)
- 3. Package resin: UL flammability grade (94V-0)

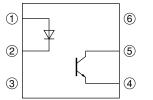
## ■ Applications

- 1. Home appliances
- 2. Programmable controllers
- 3. Personal computer peripherals

<sup>(\*)</sup> DIN EN60747-5-2: successor standard of DIN VDE0884



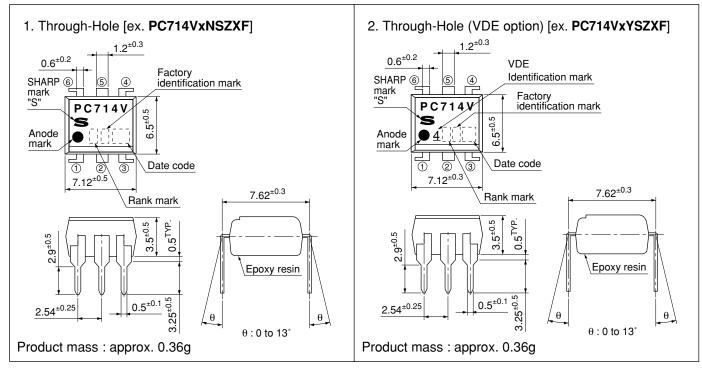
# ■ Internal Connection Diagram



- 1 Anode
- ② Cathode
- ③ NC
- 4 Emitter
- ⑤ Collector
- 6 NC

#### **■** Outline Dimensions

(Unit: mm)



Plating material: SnCu (Cu: TYP. 2%)



# Date code (2 digit)

1st digit				2nd digit		
Year of production				Month of production		
A.D.	Mark	A.D	Mark	Month	Mark	
1990	A	2002	P	January	1	
1991	В	2003	R	February	2	
1992	С	2004	S	March	3	
1993	D	2005	T	April	4	
1994	Е	2006	U	May	5	
1995	F	2007	V	June	6	
1996	Н	2008	W	July	7	
1997	J	2009	X	August	8	
1998	K	2010	A	September	9	
1999	L	2011	В	October	0	
2000	M	2012	С	November	N	
2001	N	:	:	December	D	

repeats in a 20 year cycle

# Factory identification mark

Factory identification Mark	Country of origin		
no mark	I		
	Japan		
	Indonesia		
_	China		

<sup>\*</sup> This factory marking is for identification purpose only.
Please Contact the local SHARP sales reprsentative to see the actual status of the production.

Rank mark
Refer to the Model Line-up



■ Absolute Maximum Ratings

■ Absolute Maximum Ratings $(T_a=25^{\circ}C)$							
	Parameter	Symbol	Rating	Unit			
	Forward current	$I_F$	50	mA			
Input	*1 Peak forward current	$I_{FM}$	1	A			
Inj	Reverse voltage	$V_R$	6	V			
	Power dissipation	P	70	mW			
	Collector-emitter voltage	$V_{\text{CEO}}$	80	V			
Output	Emitter-collector voltage	$V_{ECO}$	6	V			
	Collector current	$I_C$	50	mA			
	Collector power dissipation	$P_{C}$	150	mW			
Total power dissipation		P <sub>tot</sub>	170	mW			
Operating temperature		$T_{opr}$	-25 to +100	°C			
Storage temperature		$T_{stg}$	-40 to +125	°C			
*2 Isolation voltage		$V_{iso\ (rms)}$	5	kV			
*3 Soldering temperature		$T_{sol}$	260	°C			

<sup>\*1</sup> Pulse widths100µs, Duty ratio: 0.001 \*2 40 to 60%RH, AC for 1minute, f=60Hz \*3 For 10s

# **■** Electro-optical Characteristics

 $(T_a=25^{\circ}C)$ 

							(1a-25C)
	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage	$V_F$	I <sub>F</sub> =20mA	_	1.2	1.4	V
	Peak forward voltage	V <sub>FM</sub>	I <sub>FM</sub> =0.5A	_	-	3.0	V
	Reverse current	$I_R$	$V_R=4V$	_	_	10	μΑ
	Terminal capacitance	Ct	V=0, f=1kHz	_	30	250	pF
Output	Collector dark current	I <sub>CEO</sub>	$V_{CE}=50V, I_{F}=0$	-	-	100	nA
	Collector-emitter breakdown voltag	BV <sub>CEO</sub>	$I_{C}=0.1 \text{mA}, I_{F}=0$	80	_	_	V
	Emitter-collector breakdown voltag	BV <sub>ECO</sub>	$I_{E}=10\mu A, I_{F}=0$	6	_	_	V
Transfer charac- teristics	Current transfer ratio	$I_{C}$	$I_F=5mA, V_{CE}=5V$	2.5	-	30.0	mA
	Collector-emitter saturation voltag	V <sub>CE (sat)</sub>	$I_F=20\text{mA}, I_C=1\text{mA}$	_	0.1	0.2	V
	Isolation resistance	R <sub>ISO</sub>	DC500V, 40 to 60%RH	5×10 <sup>10</sup>	1×10 <sup>11</sup>	_	Ω
	Floating capacitance	$C_{\rm f}$	V=0, f=1MHz	-	0.6	1.0	pF
	Cut-off frequency	$f_C$	$V_{CE}=5V$ , $I_{C}=2mA$ , $R_{L}=100\Omega$ $-3dB$	_	80	_	kHz
	Rise time	$t_r$	$V_{CE}$ =2V, $I_{C}$ =2mA, $R_{L}$ =100 $\Omega$	_	4	18	μs
	Response time Fall time	$t_{\mathrm{f}}$		_	3	18	μs



# **■** Model Line-up

Lead Form	Through-Hole			I <sub>C</sub> [mA]	
Package	Sleeve		Rank mark		
rackage	50pcs/sleeve			$(I_F=5mA, V_{CE}=5V, T_a=25^{\circ}C)$	
DIN EN60747-5-2		Approved			
	PC714V0NSZXF	PC714V0YSZXF	with or without	2.5 to 30.0	
	PC714V1NSZXF	PC714V1YSZXF	A	4.0 to 8.0	
	PC714V2NSZXF	PC714V2YSZXF	В	6.5 to 13.0	
Model No.	PC714V3NSZXF	PC714V3YSZXF	С	10.0 to 20.0	
	PC714V5NSZXF	PC714V5YSZXF	A or B	4.0 to 13.0	
	PC714V6NSZXF	PC714V6YSZXF	B or C	6.5 to 20.0	
	PC714V8NSZXF	PC714V8YSZXF	A, B or C	4.0 to 20.0	

Please contact a local SHARP sales representative to inquire about production status.



Fig.1 Forward Current vs. Ambient Temperature

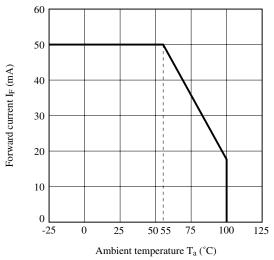


Fig.3 Collector Power Dissipation vs.
Ambient Temperature

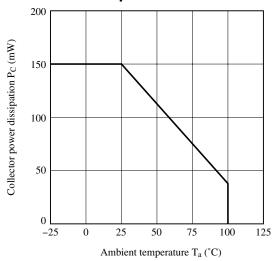


Fig.5 Peak Forward Current vs. Duty Ratio

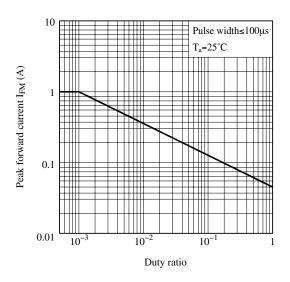


Fig.2 Diode Power Dissipation vs. Ambient Temperature

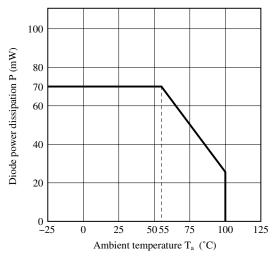


Fig.4 Total Power Dissipation vs. Ambient Temperature

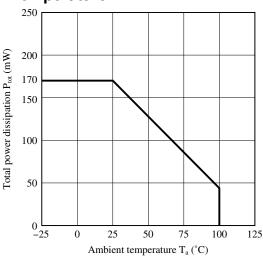


Fig.6 Forward Current vs. Forward Voltage

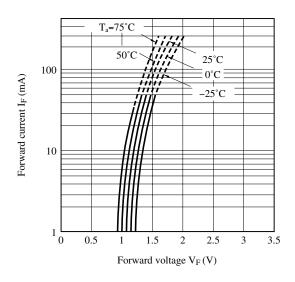




Fig.7 Current Transfer Ratio vs. Forward Current

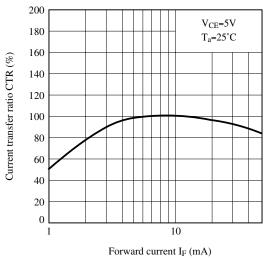


Fig.9 Relative Current Transfer Ratio vs.
Ambient Temperature

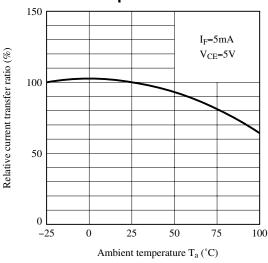


Fig.11 Collector Dark Current vs. Ambient Temperature

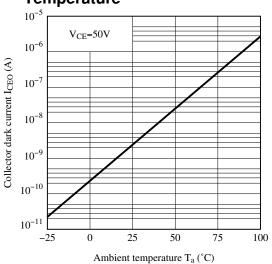


Fig.8 Collector Current vs. Collectoremitter Voltage

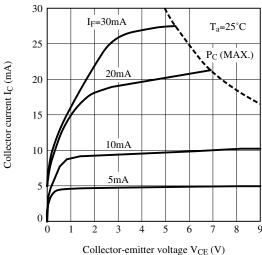


Fig.10 Collector - emitter Saturation Voltage vs. Ambient Temperature

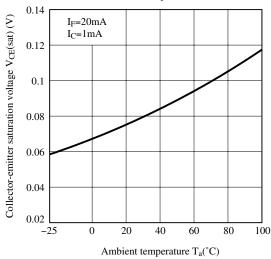
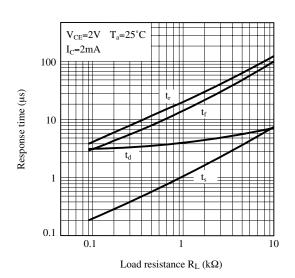


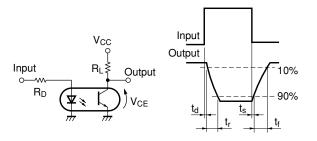
Fig.12 Response Time vs. Load Resistance



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Fig.13 Test Circuit for Response Time



Please refer to the conditions in Fig.12

Fig.14 Frequency Response

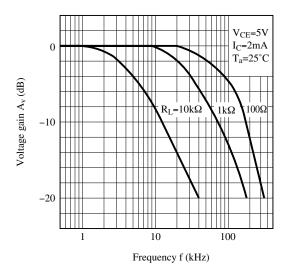
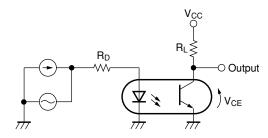


Fig.15 Test Circuit for Frequency Response



Please refer to the conditions in Fig.14

Remarks: Please be aware that all data in the graph are just for reference and not for guarantee.



# **■** Design Considerations

# Design guide

While operating at I<sub>F</sub><1.0mA, CTR variation may increase.

Please make design considering this fact.

This product is not designed against irradiation and incorporates non-coherent IRED.

# Degradation

In general, the emission of the IRED used in photocouplers will degrade over time.

In the case of long term operation, please take the general IRED degradation (50% degradation over 5 years) into the design consideration.

<sup>☆</sup> For additional design assistance, please review our corresponding Optoelectronic Application Notes.



## ■ Manufacturing Guidelines

# Soldering Method

#### Flow Soldering:

Due to SHARP's double transfer mold construction submersion in flow solder bath is allowed under the below listed guidelines.

Flow soldering should be completed below 270°C and within 10s.

Preheating is within the bounds of 100 to 150°C and 30 to 80s.

Please don't solder more than twice.

#### Hand soldering

Hand soldering should be completed within 3s when the point of solder iron is below 400°C.

Please don't solder more than twice.

#### Other notices

Please test the soldering method in actual condition and make sure the soldering works fine, since the impact on the junction between the device and PCB varies depending on the tooling and soldering conditions.



## Cleaning instructions

#### Solvent cleaning:

Solvent temperature should be 45°C or below Immersion time should be 3 minutes or less

#### Ultrasonic cleaning:

The impact on the device varies depending on the size of the cleaning bath, ultrasonic output, cleaning time, size of PCB and mounting method of the device.

Therefore, please make sure the device withstands the ultrasonic cleaning in actual conditions in advance of mass production.

#### Recommended solvent materials:

Ethyl alcohol, Methyl alcohol and Isopropyl alcohol

In case the other type of solvent materials are intended to be used, please make sure they work fine in actual using conditions since some materials may erode the packaging resin.

#### Presence of ODC

This product shall not contain the following materials.

And they are not used in the production process for this product.

Regulation substances: CFCs, Halon, Carbon tetrachloride, 1.1.1-Trichloroethane (Methylchloroform)

Specific brominated flame retardants such as the PBBOs and PBBs are not used in this product at all.

This product shall not contain the following materials banned in the RoHS Directive (2002/95/EC).

•Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE).



# ■ Package specification

# Sleeve package

Package materials

Sleeve: HIPS (with anti-static material)

Stopper: Styrene-Elastomer

# Package method

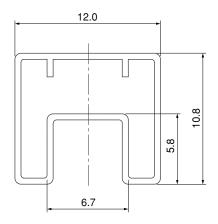
MAX. 50 pcs. of products shall be packaged in a sleeve.

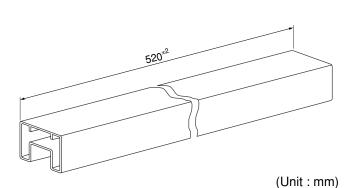
Both ends shall be closed by tabbed and tabless stoppers.

The product shall be arranged in the sleeve with its anode mark on the tabbed stopper side.

MAX. 20 sleeves in one case.

#### Sleeve outline dimensions





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  - --- Office automation equipment
  - --- Telecommunication equipment [terminal]
  - --- Test and measurement equipment
  - --- Industrial control
  - --- Audio visual equipment
  - --- Consumer electronics
- (ii) Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection

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- --- Transportation control and safety equipment (i.e., aircraft, trains, automobiles, etc.)
- --- Traffic signals
- --- Gas leakage sensor breakers
- --- Alarm equipment
- --- Various safety devices, etc.
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  - --- Telecommunication equipment [trunk lines]
  - --- Nuclear power control equipment
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